CONSOLIDATED INFORMATION TECHNOLOGY SERVICES TASK ASSIGNMENT (TA)

1. **TITLE:** (D318) Research Support and Development and Enhancement of ATOS System Software

   TA No: RDO006-Rev7
   Task Area Monitor: **Alternate Task Area Monitor:**
   NASA POC: **Software Control Class:**   Low Control
   Type of Task: Recurring Task

2. **BACKGROUND**

   The NASA Langley Airspace and Traffic Operations Laboratory (ATOL) houses a suite of complex high-fidelity simulation systems dedicated to the research of advanced Air Traffic Management (ATM) concepts and technologies. For the past decade, the ATOL's primary focus has been to support the NASA Airspace Systems Program effort in coordination with the Joint planning and Development Office (JPDO) Next Generation Air Transportation System (NextGen) and its partners. More recently, the growth and maturation of the ATOL research capabilities has elicited interest from other government agencies such as the FAA and DOD as well as other commercial industries. In this context, NASA-LaRC focus has now shifted beyond developing and enhancing the models and simulation systems to include the establishment of processes and organization structures that will enable the provision of research services to multiple ATOL customers.

3. **OBJECTIVE**

   The objective of this task will be to develop and enhance NASA-Langley Research Center?s Airspace and Traffic Operations Simulation, including methodologies to enable research experiments in support of future air transportation system concepts and technologies such as those currently being explored by NASA?s Airspace Systems Program projects (NextGen Airspace and NextGen Airportal). The task will explore new methodologies for the development and enhancement of distributed airborne simulation tools, design and develop new engineering models of revolutionary and enabling airborne technologies, integrate these new simulation tools and engineering models into the ATOS, and aid in the conduct of simulations (including experiment design, data analysis, and reporting). The overarching goal will be to produce and maintain an integrated, operational, and productive Air Traffic Management (ATM) research tool that also incorporates capabilities for transitioning to simulations of airport surface operations.

   Research goals will be met through studies and experiments conducted using the ATOS (hosted in the Air Traffic Operations Lab, or ATOL, at LaRC) as well as with other simulation tools that may be linked to the ATOS for specific experiments. These research goals include (1) evaluating the impact of uncertainties, real-world system behaviors, weather, and human factors on the safety and performance of airborne trajectory management applications; (2) developing new 4D dynamic Required Navigation Performance (RNP) capabilities and

determining how they may affect the performance of various airborne applications integrated with ground-based operations; (3) creating new metrics for dynamic airspace complexity and evaluating the effects of various distributed complexity-mitigation functions and en-route coordination strategies; and (4) evaluating different algorithms and procedures for super-density terminal area merging and spacing applications. In the area of airport surface operations, research goals include (1) evaluating Collision Avoidance for Airport Traffic (CAAT) algorithms in the low altitude, runway, and taxiway operating environment; (2) evaluating integrated aircraft-based CAAT and ground-based taxi conformance monitoring and longer term collision detection and resolutions solutions; and (3) developing and evaluating algorithms and procedures to maximize airport arrival and departure capacity, including reduced in-trail separation requirements, closely-spaced and converging/intersecting runway operations, and runway balancing.

Development, implementation, and integration of new simulation capabilities will be required to perform vital studies and experiments in support of planned research goals. These simulation capabilities generally fall into the following categories: (1) development of engineering models of advanced technologies that enable new concepts of operation, such as airborne four-dimensional (4D) trajectory & separation management, terminal area merging and spacing, and in-trail procedures (oceanic and domestic) for enroute climbs and descents; (2) new 4D trajectory generation capability for the on-board flight management computer (FMC), including a common lexicon for the exchange of 4D trajectory data between various airborne and ground-based systems and applications; (3) advancements in the simulation of the basic aircraft, including airframe and engine performance models and control laws; (4) improvements to fundamental simulation control functions, including timing, mode transitions, and scenarios, that support the full range of experiment types from real-time human-in-the-loop studies to large-scale batch runs; and (5) evaluation of algorithms and procedures for airport arrival and departure operations.

4. GENERAL IT SUPPORT SERVICES

Services Specified Through Exhibit A:
System administration and information technology services will be provided to support computers used in the contractor?s developer labs. These computers are located at the contractor?s facility and are not associated with research computers in the ATOL. It is assumed any COTS software needed to support the task and required to be on the computers described herein will be provided by NASA and hardcopy media of the software will be provided to the System Administrator in the event the software needs to be removed, updated and/or reinstalled.

Exceptions and Additional Requirements:
The contractor will provide data backup and recovery services for the contractor?s computers and the contractor?s lab computers as part of this task. This is not a hardware maintenance task. The contractor?s System Administrator will troubleshoot the contractor?s computer hardware and report issues back to the NASA point of contact for purchase or repair which will be at the expense of NASA.

General IT Support Services Performance Metrics
Performance Standard: Performance Standard: The contractor delivers product within costs and schedule.
Performance Metrics:

Exceeds: The contractor delivers application to the customer prior to scheduled delivery date and under cost.

Meets: The contractor delivers application to the customer on scheduled delivery date and within cost.

Fails: The contractor delivers application to the customer after scheduled delivery date and/or exceeds stated cost by more than ten percent.

Performance Standard: Product quality meets customer expectations.

Performance Metrics:

Exceeds: Product performance exceeds customer's documented requirements and expectations. Product provides service to the customer beyond anticipated use requirements. Customer provides written or verbal communication indicating the same.

Meets: The product performs as documented in the requirements and meets customer needs. Customer is satisfied with product and uses in the manner intended.

Fails: Product does not perform as documented in the requirements and customer expectations are not met. Customer is not satisfied with product and cannot use in the manner intended.

5. SYSTEM AND APPLICATION DEVELOPMENT SERVICES

Project Title: ATOS Research & Development

LaRC Software Manager: Michael Guminsky

Software Software Control Class: Low

Responsibilities of Contractor and LaRC personnel:NASA will provide the contractor with access to the Airspace and Traffic Operations Lab (ATOL), appropriate computer software licenses, and computer equipment located at the contractor?s facility for development, integration, and test of all software developed in support of this task. NASA will refresh the contractor?s research integration lab equipment, as required, to maintain equivalent specification and capability levels with the research equipment in the ATOL. NASA will provide requirements and concept of operations documentation and software as described in the projects. The availability of any Government-provided software and documentation will depend on release dates, rights in data, and may require nondisclosure agreements to be executed. The contractor will provide design, development, integration and testing against the requirements and concepts as conveyed by NASA. The contractor will provide support to NASA researchers in defining and testing experiment scenarios, in running experiments, and in collecting experiment data.

Requirements:
* The contractor shall participate as members of the Systems Engineering Management Team (SEMT) and the Software Systems Engineering (SSE) group.
* The contractor shall participate in conferences related to the goals and objectives of this task as defined and approved by the customer.
* The contractor shall produce a development schedule with identifiable tasks and

milestones so that incremental progress can be quantitatively measured.
* The contractor shall support NASA in feasibility studies, concept of operations and general research.
* The contractor shall design and develop software that will support the concepts and requirements as documented by NASA.
* The contractor shall conduct a Design Review (DR) on the design of all new features.
* The contractor shall perform system integration testing on all software that exercises all functional capabilities applicable to past, planned or intended research experiments.
* The contractor shall provide testing results and procedures as part of the incremental build release documentation.
* The contractor shall lead the system integration effort for all software developed under this task, all software and hardware furnished by the government and all other research contractor provided software
* The contractor shall perform ATOS software maintenance during the post integration and test phases of development to include software problem reporting, recommended fixes, impacts to other software, recommended enhancements, etc.
* Contractor developed software shall be provided to NASA for unrestricted use and duplication by NASA.
* NASA may approve limited exceptions if benefit to the project can be justified

Constraints:
To the extent possible, the following constraints apply:
* Programming Language C++, JAVA and scripting languages.
* Platform and Operating system independent code.

Acceptance Criteria:
Delivery of a product is deemed complete once the deliverable has
a) completed a capabilities demonstration witnessed by the customer
b) been submitted into the project?s configuration management system (ClearCase) as a configuration controlled item

6. **WORK-AREA SPECIFIC SERVICES**

   None required.

7. **Exhibit A**

   None required.

8. **SPECIAL SECURITY REQUIREMENTS**

   None required.

9. **SOFTWARE ENGINEERING PROCESS REQUIREMENTS**

   * The contractor shall deliver and comply with a revised Software Development Plan (SDP) and Configuration Management Plan (CMP).

* The contractor shall manage version control using the established Rational ClearCase environment unless otherwise specified by the Government.

10. JOINT REVIEW SCHEDULE

The contractor shall participate as a member of the System Engineering Management Team (SEMT) and the System Software Engineering (SSE) in weekly update meetings to review/discuss progress and issues related to the task.

11. PERIOD OF PERFORMANCE

This TA is effective from 10/01/04 to 04/27/10

12. TECHNICAL PERFORMANCE RATING

Quality is important, but delivery on schedule is also required for the success of this project.

Quality: 70%   Timeliness: 30%

13. RESPONSE REQUIREMENTS

This Task Plan shall address the contractor's specific work plans, associated estimated labor hours, cost and schedule.

14. GOVERNMENT ESTIMATED COST
15. FUNDING INFORMATION

Funding has not been entered for this TA.

16. MILESTONES

Date	MileStones
09/30/2009	Release Build 2009-02 Capabilities Demonstration
02/28/2010	Release Build 2009-03 Capabilities Demonstration

17. DELIVERABLES

Number	Deliverable Item	Deliverable Schedule
1	Configuration Management Plan (CMP) Update	8/1/2009
2	Release Build 2009-02 and Capabilities Demonstration	9/30/2009
3	Release Build 2009-02 Documentation	9/30/2009

4	Software Development Plan (SDP) Update	12/31/2009
5	Release Build 2009-03 and Capabilities Demonstration	02/28/2010
6	Release Build 2009-03 Documentation	02/28/2010
7	Software Architect Design Document (SADD) Update	04/27/2010
8	Weekly Status Reports	Weekly
9	Monthly ATOS Schedule / Milestone Reports	Monthly

18. FILE ATTACHMENTS

None.